SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation, and connection of exterior luminaries, controls, poles and supports.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.

B. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.

C. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.

D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Underground handholes and conduits.

E. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include electrical ratings, dimensions, mounting, details, materials, required clearances, terminations, wiring and connection diagrams, photometric data, ballasts, poles, luminaries, lamps and controls.

C. Manuals: Two weeks prior to final inspection, submit four copies of operating and maintenance manuals to the COTR. Include technical data sheets, wiring and connection diagrams, and information for ordering replacement parts.

D. Certifications: Two weeks prior to final inspection, submit four copies of the following to the COTR:
   1. Certification that the materials are in accordance with the drawings and specifications.
   2. Certification, by the Contractor, that the complete installation has been properly installed and tested.

1.4 APPLICABLE PUBLICATIONS

Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

A. Aluminum Association Inc. (AA):
   AAH35.1-2006 .....Alloy and Temper Designation Systems for Aluminum

B. American Association of State Highway and Transportation Officials (AASHTO):
   LTS-4-2003 .....Structural Supports for Highway Signs, Luminaries and Traffic Signals

C. American Concrete Institute (ACI):
   318-2005 .....Building Code Requirements for Structural Concrete

D. American National Standards Institute (ANSI):
   C57.12-2000.....General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers
   C81.61-2005 .....Electrical Lamp Bases

E. American Society for Testing and Materials (ASTM):
   A123/A123M-2002 .....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
   A153/A153M-2001.....Zinc Coating (Hot-Dip) on Iron and Steel Hardware – AASHTO No.: M232
   B108-03a -2003 .....Aluminum-Alloy Permanent Mold Castings
   D3487-2000.....Mineral Insulating Oil Used in Electrical Apparatus

F. Federal Aviation Administration (FAA):
   AC 70/7460-IK CHG 1-2000.....Obstruction Lighting and Marking

AC 150/5345-43E-1995....Specification for Obstruction Lighting Equipment

G. Illuminating Engineering Society of North America (IESNA)

HB-9-2000.....Lighting Handbook

RP-8-2000 (R-2005).....Roadway Lighting

H. National Electrical Manufacturers Association (NEMA):

C78.41-2001.....Electric Lamps – Guidelines for Low-Pressure Sodium Lamps

C78.42-2004 .....Electric Lamps – Guidelines for High-Pressure Sodium Lamps

C78.43-2005 .....Electric Lamps – Single-Ended Metal-Halide Lamps

C78.1381-1998.....(R 1997) Electric Lamps – 70-Watt M85 Metal-Halide Lamps

C82.4-2002 .....Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)

C136.17-2005 .....Roadway Lighting Equipment – Enclosed Side-Mounted Luminaries for Horizontal-Burning High-Intensity-Discharge Lamps

ICS 2-2005 .....Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts

ICS 6-2001 .....Industrial Control and Systems Enclosures

I. National Fire Protection Association (NFPA):

70-2008 .....National Electrical Code (NEC)

J. Underwriters Laboratories, Inc. (UL):

496-2004 .....Edison-Base Lamp holders

773-1995.....Plug-in, Locking Type Photo controls, for Use with Area Lighting

773A-2006 .....Non-industrial Photoelectric Switches for Lighting Control

1029-1994.....High-Intensity-Discharge Lamp Ballasts

1598-2004 .....Luminaries

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Materials and equipment shall be in accordance with NEC, UL, ANSI, and as shown on the drawings and specified.

2.2 LUMINAIRES

A. UL 1598 and NEMA C136.17. Luminaries shall be weatherproof, heavy duty, outdoor types designed for efficient light utilization, adequate dissipation of lamp and ballast heat and safe cleaning and relamping.

B. Incorporate ballasts in the luminaire housing except where otherwise shown on the drawings.

C. Lamp sockets for high intensity discharge (H.I.D) fixture shall have locking type porcelain enclosures in conformance to the applicable requirements of ANSI C81.61 and UL 496.

D. Pre-wire internal components to terminal strips at the factory.

2.3 LAMPS

A. Install the proper lamps in every luminaire installed.

B. Lamps to be general-service, outdoor lighting types.

C. Metal-Halide Lamps: NEMA C78.43 or NEMA C78.1381

D. Mercury vapor lamps shall not be used.

2.4 LED FIXTURES

A. Fixtures shall be manufactured and assembled in the United States and meets the buy American requirements within the American Recovery and Reinvestment Act and be UL Listed.

B. Light Emitting Diodes shall be manufactured by Cree, Lumiled, or Nachia; no approved equal.

C. Drivers shall be manufactured by Osram/Sylvania, Phillips/Advance, or ADL Technology and be capable of accepting the voltage indicated on the drawings and capable of dimming if required. The driver shall meet the following requirements:

1. Class A Sound Rating
2. Total Harmonic Distortion of less than 20 percent.
3. Operating temperature between -40 degree Celsius and 40 degrees Celsius.
4. Driver shall not contain any Polychlorinated Biphenyl (PCB).

D. All LED fixtures shall be tested to IESNA LM-79-2008 and LM-80-2008 and meet the following:

1. Fixture Efficacy (Lumens per watt): 60 or greater.
2. Color Accuracy: Color Rendering Index (CRI): 70 or greater.
3. Light Color: As indicated on lighting fixture schedule.
4. Outdoor fixtures shall be IP65 Rated.
5. LEDs, driver and all components shall have a system lifetime of 50,000 hours or more at 25 degrees Celsius.
6. Fixture shall have a minimum of a five year warranty on all components and finishes.

2.5 HIGH INTENSITY DISCHARGE BALLASTS

A. For low voltage systems, the ballasts shall be the high efficiency, high power factor, copper-wound constant wattage type and shall meet the requirements of UL 1029 and NEMA C82.4.
   1. Ballasts shall operate the discharge lamp of the type, wattage, and voltage shown on the drawings.
   2. Ballasts shall have individual overcurrent protection (inline fuse holder) as recommended by the ballast manufacturer.
   3. Ballasts shall be capable of providing reliable starting of the lamps at minus 30 degrees C.
   4. Open-circuit operation shall not reduce the average life.

B. Each ballast shall operate not more than one lamp except where otherwise shown on the drawings.

2.5 CONTROLS

A. As Indicated on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lighting in accordance with the NEC, as shown on the drawings, and in accordance with manufacturer’s recommendations.

3.2 GROUNDING

Ground noncurrent-carrying parts of equipment as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable and listed for this purpose.

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